

1 4. (Amended) The method of Claim 23 wherein said first index is stored
2 internally of the parcel associated therewith.
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1 5. (Amended) The method of Claim 23 further comprising:
2 with respect to each of said parcels, storing a second index identifying boundaries
3 of each of said plurality of sub-areas.
4

B2 1 8. (Amended) The method of Claim 23 wherein with respect to each
2 parcel, the data entities that represent geographic features encompassed by each of said
3 plurality of sub-areas are approximately equal in number to the data entities that represent
4 geographic features encompassed by each of the other of the plurality of sub-areas.
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1 9. (Amended) The method of Claim 23 wherein the data entities represent
2 segments of roads in the geographic region.
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1 10. (Amended) The method of Claim 23 wherein the step of dividing forms
2 eight sub-areas.
3

B3 1 13. (Amended) The method of Claim 25 wherein said data entities
2 represent segments of roads.
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1 14. (Amended) The method of Claim 25 wherein the first index is a kd-tree
2 index.
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1 15. (Amended) The method of Claim 25 wherein the second index is a
2 bitmap.
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1 17. (Amended) The invention of Claim 26 further comprising:
2 a plurality of index tables of a second type, each of which is associated with a
3 separate respective one of said plurality of parcels, wherein each of said index tables of
4 the second type comprises:
5 a reference to each of a plurality of separate sub-areas into which the area
6 associated with the respective parcel is divided.

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1 19. (Amended) The invention of Claim 27 wherein the sub-areas associated
2 with each parcel are spatially organized.

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1 20. (Amended) The invention of Claim 27 wherein the data entities
2 associated with each rectangular sub-area are approximately similar in number to each
3 other.

Please add new Claims 23-29.

B6
sub 1

1 23. (new) A method for producing a database that represents geographic
2 features in a geographic region comprising the steps of:
3 separating a plurality of data entities that represent the geographic features into a
4 plurality of parcels,
5 wherein each parcel of said plurality of parcels contains a separate
6 subset of said plurality of data entities, and
7 wherein the subset of said plurality of data entities contained in
8 each parcel represents the geographic features located in a separate one of
9 a plurality of areas into which the geographic region is divided;
10 for each parcel of said plurality of parcels,
11 dividing the area associated therewith into a plurality of sub-areas;
12 and
13 storing a first index that identifies, for each of the data entities
14 contained in the parcel, each of the sub-areas intersected by the geographic
15 feature represented thereby,

16 whereby each sub-area in which a geographic feature is located can be determined
17 by using the first index.

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1 24. (new) A method of using a geographic database comprising the steps of:
2 accepting specification of a search area in a geographic region represented by the
3 geographic database;

4 identifying a parcel of data in the geographic database, wherein the parcel
5 contains data entities that represent geographic features encompassed within a first
6 rectangular area located within the geographic region, wherein the first rectangular area
7 intersects said search area;

8 using a first index associated with the parcel to identify which of a plurality of
9 rectangular sub-areas into which the first rectangular area is divided intersect the search
10 area; and

11 using a second index associated with the parcel to identify the data entities
12 contained in the parcel that intersect each of the plurality of rectangular sub-areas
13 identified as intersecting the search area,

14 whereby the data entities that represent the geographic features located within the
15 search area are determined.

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1 25. (new) A method of using a geographic database to identify geographic
2 features located within a search area, wherein the geographic database contains data
3 entities that represent geographic features located in a geographic region, and wherein the
4 geographic database is organized into parcels, each of which contains a subset of all the
5 data entities in the geographic database, and wherein the subset of data entities in each
6 parcel represent the geographic features encompassed within a separate respective one of
7 a plurality of rectangular areas into which the geographic region is divided, wherein the
8 method comprises the steps of:

9 (a) identifying each parcel that is associated with a rectangular area that
10 intersects the search area;

11 (b) for each parcel identified in step (a), using a first index associated with the
12 parcel to identify each rectangular sub-area formed of the rectangular area associated
13 with the parcel that intersects the search area; and

14 (c) for each parcel identified in step (a), using a second index associated with
15 the parcel to identify each of the data entities contained therein that represents a
16 geographic feature that intersects each of the sub-areas identified in step (b),
17 whereby the data entities identified in step (c) represent geographic features
18 located in the search area.

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1 26. (new) In a geographic database comprised of data records, wherein each
2 data record represents a physical geographic feature in a geographic region,

36 3 wherein the data records are separated into a plurality of parcels,
4 wherein each parcel contains a separate portion of the data records, such that the
5 portion of data records contained in each parcel represents those geographic features
6 encompassed together in a separate respective one of a plurality of areas formed by
7 dividing the geographic region,

8 wherein the improvement comprises:

9 a plurality of index tables of a first type, each of which is associated with a
10 separate one of said plurality of parcels and wherein each of said index tables of the first
11 type comprises:

12 a separate reference to each data record in the parcel to which said index
13 table is associated; and

14 a reference to at least one of a plurality of groupings of the plurality of
15 data records in the parcel,

16 wherein the plurality of groupings are based upon a division of the area associated
17 with the parcel into a plurality of smaller sub-areas.

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19 27. (new) A geographic database comprising:

20 (a) data entities, each of which represents a geographic feature in a
21 geographic region,

22 wherein the data entities are separated into a plurality of parcels,

5 wherein each parcel contains a subset of the data entities,
6 wherein the subset of data entities in each parcel represents those
7 geographic features encompassed within a separate respective one of a plurality of
8 rectangular areas into which the entire geographic region is divided; and
9 (b) a plurality of indexes, each of which is associated with a separate
10 respective one of said plurality of parcels, and wherein each index relates each of the data
11 entities in the subset of data entities contained in the parcel associated therewith to at
12 least one rectangular sub-area formed of the rectangular area associated with the parcel
13 associated therewith,
14 wherein said geographic database is stored on a computer readable storage
15 medium.

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1 28. (new) The invention of Claim 27 wherein said data entities represent
2 segments of roads.

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Sub 3
2 29. (new) A computer usable medium having computer readable data
3 structure means embodied thereon, wherein the computer readable data structure means is
4 used for a database for geographic data comprised of data records that represent segments
5 of roads located in a geographic region, said computer readable data structure
6 comprising:

7 a plurality of parcels, each of which contains a separate portion of the data
8 records, such that each parcel contains the data records that represent the segments of
9 roads located in a separate one of a plurality of areas into which the geographic region is
10 divided;

11 a plurality of first indexes, each of which is associated with a respective one of the
12 plurality of parcels, wherein each first index defines a plurality of sub-areas formed of the
13 area associated with the parcel associated therewith; and

14 a plurality of second indexes, each of which is associated with a respective one of
15 the plurality of parcels, wherein each second index associates each of the data records in
16 the parcel associated therewith to at least one of the plurality of sub-areas defined by the
first index associated with the parcel,